

TITLE

**METHOD FOR INFORMING A TRANSMITTING MODULE
OF ERROR OCCURRENCE IN A RECEIVING PART OF A FACSIMILE**

CLAIM FOR PRIORITY

This application makes reference to, incorporates herein and claims all rights accruing under 35 U.S.C. §119 from my earlier filing in the Korean Industrial Property Office of an application for a patent entitled *Method For Informing A Transmitting Part Of Error Occurrence In A Receiving Part Of A Facsimile* on the 19th day of July 1999, a copy of which is annexed hereto.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a process for informing a transmitting facsimile machine of error occurrence in a receiving facsimile machine of a facsimile. More specifically, the present invention stores transmitting subscriber identification (TSI) information that is the telephone number of the transmitting facsimile machine, calls the telephone number in the event that a communication line is cut off due to error.

1 occurrence in receiving facsimile data, and informs the transmitting facsimile
2 machine of error information including the contents of the error occurring in the
3 receiving facsimile machine and the telephone number of another receiving facsimile
4 machine that is capable of serving for the first receiving facsimile machine.

5 Description of the Related Art

6 Generally, a facsimile includes a scanner for reading a document, a printer for
7 outputting data in shape of letters, and a communication member such as a telephone
8 cable for transmitting/receiving data to/from the other party in a wide area and the
9 components are integrally formed to allow documents to be exchanged between two
10 parties. In order to transmit and receive fax data using such a facsimile, protocols are
11 exchanged between the transmitting facsimile machine (*i.e.*, a transmitter) and the
12 receiving facsimile machine (*i.e.*, a receiver). In the event that an error within the
13 receiving facsimile machine such as, by way of example, a paper jam, depletion of the
14 paper empty, a toner low condition, a full memory and the like, while facsimile data
15 is being transmitted from the transmitting facsimile machine to the receiving
16 facsimile, the receiving facsimile can not receive further data. Accordingly, the
17 receiving facsimile transmits a disconnect command (*i.e.*, a DCN signal) that

1 indicates the termination of communication, to the transmitting facsimile and cuts off
2 the communication line.

3 I have noticed that when the line of communication line is interrupted or
4 otherwise discontinued due to the occurrence of an error at the receiver, the
5 transmitter module tries to re-transmit the facsimile data. When the error in the
6 receiver continues, the call from the transmitter may not be completed within Phase A.

As a result, the transmitter does not know that the error has occurred in the receiver
and continuously tries to transmit fax data from the transmitting facsimile machine.
Moreover, I have found that the transmitter is unable to determine the type of error
occurring in the receiver, and in the event that the transmitter does not know the
number of another facsimile, the transmitter continuously redials the same number
until the call has been completed with the receiver.

13 SUMMARY OF THE INVENTION

14 It is therefore an object of the present invention to provide an improved
15 apparatus and process for facsimile telecommunication.

16 It is another object to provide to provide apparatus and process able to
17 compensate for errors that occur during the reception of facsimile

1 telecommunications.

2 It is still another object to provide a process for transmitting error information
3 including contents of error occurring in the receiving facsimile machine and the
4 telephone number of another facsimile which is capable of receiving fax data instead
5 of the error occurred receiving facsimile machine so that fax data can be continuously
6 transmitted even though the error occurs in the receiving facsimile machine while the
fax data is being transmitted.

These and other objects may be attained with a facsimile circuit and process
that informs the transmitting facsimile machine of error occurrence in a first receiving
facsimile machine of a facsimile, by inputting the telephone number of a second
facsimile for receiving fax data when an error occurs in the first receiving facsimile
machine while the first receiving facsimile machine receives the fax data; when a ring
signal is input from the transmitting facsimile machine of the fax data, forming a
communication line, exchanging protocols and storing the telephone number of the
transmitting facsimile machine that is TSI information among the protocols received
from the transmitting facsimile machine; printing the fax data received from the
transmitting facsimile machine and checking whether an error occurs or not at the
same time; if an error occurs, detecting an error message corresponding to the error

1 from a pre-stored error table and storing the error message; after the communication
2 line is cut off from the transmitting facsimile machine due to the error occurrence,
3 detecting the telephone number of the transmitting facsimile machine and forming the
4 communication line; and when the communication line with the transmitting facsimile
5 machine is formed, transmitting error information occurring in the facsimile of the
6 receiving facsimile machine to the transmitting facsimile machine.

7 The error information includes at least the telephone number of the second
8 facsimile and the error message. When the telephone number of the transmitting
9 facsimile machine and the communication line are formed, the error information is
10 changed into bit-map data. The error information of the facsimile of the receiving
11 facsimile machine transmitted to the transmitting facsimile machine is printed in the
12 facsimile of the transmitting facsimile machine in a predetermined way. Preferably,
13 the error table is a look-up table including error messages respectively corresponding
14 to at least one error that may occur in the facsimile.

15 BRIEF DESCRIPTION OF THE DRAWINGS

16 A more complete appreciation of this invention, and many of the attendant
17 advantages thereof, will be readily apparent as the same becomes better understood

1 by reference to the following detailed description when considered in conjunction
2 with the accompanying drawings in which like reference symbols indicate the same
3 or similar components, wherein:

4 Fig. 1 is a conceptional view illustrating a protocol for transmitting and
5 receiving facsimile telecommunications data;

6 Fig. 2 is a schematic block diagram of a facsimile telecommunications system
suitable for the practice of the present invention;

7 Fig.3 is a flowchart illustrating the storage of error information when an error
8 occurs within the receiving facsimile machine;

9 Fig. 4 is a flowchart illustrating the transmission of error information stored
10 by the operation shown by Fig. 3, to the transmitting facsimile machine; and

11 Fig. 5 is an embodiment of a report received from the transmitting facsimile
12 machine in which the error information of the receiving facsimile machine is
13 included.
14

15 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

16 Turning now to the drawings, Figure 1 is a conceptional view illustrating
17 protocol for transmitting and receiving fax data. Calls are placed during in Phase A.

1 The transmitting facsimile machine, while in an hook-off state, transmits a calling
2 tone (CNG) signal to the receiving facsimile machine by dialing until the receiving
3 facsimile machine responds. Upon reception of the CNG signal from the
4 transmitting facsimile machine, the receiving facsimile machine transmits a called
5 station identification (CED) signal, that is, a responsive signal, to the transmitting
6 facsimile machine.

7 In Phase B, states of terminals and transmitting lines are checked and the
8 terminals are controlled. At this time, the transmitting and receiving standby states
9 and the synchronizing state of the terminals are checked and the fax data is prepared
10 to be transmitted. More particularly, during Phase B, the receiving facsimile machine
11 transmits the CED signal to the transmitting facsimile machine and then transmits
12 non-standard facilities signals (NSF) used for recognizing specific user demand that
13 cannot be covered by T recommendation, called subscriber identification (CSI) used
14 for supplying a specific identifying member of a subscriber of the receiving facsimile
15 machine by means of an international telephone number, and a digital identification
16 signal (DIS) that specifies the standard CCITT capability of equipments of the
17 receiving facsimile machine to the transmitting facsimile machine.

18 The transmitting facsimile machine understands the state of the receiving

1 facsimile machine by receiving signals transmitted from the receiving facsimile
2 machine and then transmits non-standard facilities set-up (NSS) that is a digital
3 command responding to information included in the NSF signal, transmitting
4 subscriber identification (TSI) used for supplying a specific identifying member of
5 a subscriber of the transmitting facsimile machine by means of the international
6 telephone number, and a digital command signal (DCS) that is a digital setup
command responding to the standard capacity checked by the DIS signal.

When an environment for transmitting fax data is fixed as described above, the
transmitting facsimile machine finally determines fax data transmitting speed between
the transmitting facsimile machine and the receiving facsimile machine through a
training check (TCF) process and the receiving facsimile machine transmits
confirmation to receive (CFR) that is a responding signal for confirming start of
message transmission corresponding to TCF of the transmitting facsimile machine.

In Phase C, message transmission, message transmission check and
synchronization maintenance is performed.

In Phase D, message and reception is terminated. The transmitting facsimile
machine transmits end of procedure (EOP) showing completion of message
transmission, and the receiving facsimile machine transmits message confirmation

1 (MCF) showing that entire message is satisfactorily received to the transmitting
2 facsimile machine. As receiving the MCF from the receiving facsimile machine, the
3 transmitting facsimile machine transmits disconnect (DCN) that is a command
4 showing termination of communication and cuts off the communication line.

5 As described above, fax data transmission between the transmitting facsimile
6 machine and the receiving facsimile machine is performed through exchange of
7 protocols. However, in the event that an error such as paper jam, paper empty, toner
8 low, memory full and the like occurs in the receiving facsimile machine while fax
9 data is transmitted from the transmitting facsimile machine to the receiving facsimile
10 machine, the receiving facsimile machine cannot receive further data. Accordingly,
11 the receiving facsimile machine transmits the DCN to the transmitting facsimile
12 machine and cuts off the communication line.

13 When the communication line is cut off due to error occurrence in the receiving
14 facsimile machine, the transmitting facsimile machine tries to transmit fax data again.
15 However, in the case that the error occurring in the receiving facsimile machine is not
16 removed, call is not determined in Phase A. As a result, the transmitter does not
17 know the error occurrence in the receiving facsimile machine and continuously tries
18 to transmit fax data from the transmitting facsimile machine. Moreover, the

1 transmitter cannot check the sort of the error occurring in the receiving facsimile
2 machine and in the event that the transmitter does not know the number of another
3 facsimile, the transmitter needs to continuously dial the same number until the call
4 is formed with the receiving facsimile machine.

5 The present invention will now be described more fully hereinafter with
6 reference to the accompanying drawings. Like reference symbols in the drawings
indicate the same or similar components. Specification of components, such as
components of circuits are provided for description purpose. It is therefore apparent
to those skilled in this art that the present invention can be embodied without the
specified components. The detailed description might be omitted when it is
determined that related prior art or the detailed description of the structure may
unnecessarily make indistinct the point of the present invention.

13 Figure 2 is a schematic block diagram of a facsimile applied to the present
14 invention, Figure 3 is a flowchart of storing error information when an error occurs
15 in the receiving facsimile machine, Figure 4 is a flowchart of transmitting the error
16 information stored by the operation of Figure 3 to the transmitting facsimile machine;
17 and Figure 5 is an embodiment of a report received from the transmitting facsimile
18 machine in which the error information of the receiving facsimile machine is

1 included.

2 Referring to Figure 2, a controller 10 generally controls the system according
3 to a predetermined program. Particularly, the controller controls the system to
4 transmit the telephone number of a second facsimile which is stored in advance and
5 error information to the transmitting facsimile machine in the event that an error
6 occurs while the fax data is received.

7 Thus, the invention provides a facsimile transmitting apparatus that includes
8 a means (an informing means) for furnishing information to the apparatus concerning
9 error occurrence the structures that accomplish this function are described next. As
10 will appear, in a preferred embodiment of the invention, the informing means
11 comprises a means for furnishing the transmitting facsimile apparatus with
12 information concerning contents of an error (for example, "out of paper" error)
13 occurring at the receiving facsimile apparatus as well as a telephone number of a
14 second facsimile apparatus that is capable of receiving the facsimile message when
15 the first facsimile machine is inoperative, for example, out of paper.

16 A memory 20 includes an operation program for operating controller 10 and
17 a general control program, and stores data produced by program performance of
18 controller 10. Particularly, according to a preferred embodiment of the present

invention, the telephone number of the second facsimile is input by a user through an operational panel 40 in order to receive the fax data instead of the first facsimile, in the event that an error occurs while the first facsimile receives fax data. An error table including messages corresponding to various errors that may occur while the fax data is received is stored in memory 20. Furthermore, TSI information showing the telephone number of the transmitting facsimile machine among the signals received from the transmitting facsimile machine while the protocol is exchanged is stored in the memory in order to transmit the pre-stored telephone number of the second facsimile and the error information detected from the error table to the transmitting facsimile machine, in the event that an error occurs while the fax data is received.

The telephone number of the second facsimile stored in memory 20 and an error message corresponding to the error occurring while the fax data is received among the error messages stored in the error table are stored in an error buffer 30 according to the control of controller 10, in the event that an error occurs while fax data is received. Operational panel 40 includes a plurality of keys. Operational panel 40 supplies controller 10 with key data output when the keys are pressed and includes a displaying member for displaying the operating state of the system by means of display data of controller 10. A scanner 50 scans a document, converts the image of

the document into binary data, and supplies controller 10 with the binary data.

A modem 60 modulates and demodulates input and output signals of controller 10. A network control unit (NCU) 70 forms a communication line between a public switching telephone network (PSTN) and modem 60 according to control of controller 10. A printer 80 prints data received from external environment through modem 60 or data scanned in scanner 50 and stored in memory 20 according to control of controller 10. A sensor 90 inputs the state of the document and papers into controller 10 and a speaker 100 generates a warning sound corresponding to a control signal of controller 10.

The operation of the invention having the above-mentioned structure will be described in detail with reference to Figures 3 to 5. Figure 3 is a flowchart for storing error information to be transmitted to the transmitting facsimile machine in the event that an error occurs in the receiving facsimile machine. First, a user inputs the telephone number of the second facsimile through operational panel 40 to receive the fax data instead when fax data cannot be received due to error occurrence (S301). Controller 10 stores the telephone number of the second facsimile input by the user in memory 20 (S302). Thereafter, controller 10 checks whether a ring signal is input from external environment through the PSTN or not (S303). If the ring signal is

1 input, controller 10 forms a communication line and performs protocol exchanges
2 (S304).

3 Controller 10 exchanges protocols with the transmitting facsimile machine by
4 controlling modem 60 and NCU 70, detects the TSI information received from the
5 transmitting facsimile machine, i.e., the telephone number of the transmitting
6 facsimile machine in Phase B and stores the telephone number in memory 20 (S305).
7 Then, controller 10 receives data transmitted from the transmitting facsimile machine,
8 prints the data through printer 80 (S306) and checks whether the data is completely
9 received or not (S307).

10 If it is checked that the data is completely received, the communication line
11 with the transmitting facsimile machine is cut off (S308). Otherwise, if it is checked
12 that the data is not completely received, it is checked whether an error occurs in the
13 facsimile or not (S309). If it is checked that an error does not occur in the facsimile,
14 step S309 is followed by step S306 to receive data from the transmitting facsimile
15 machine. Otherwise, if it is checked that an error occurs in the facsimile and it is
16 impossible to receive further fax data, controller 10 determines the sort of the error
17 occurring in the facsimile and detects an error message corresponding to the
18 determined error from the error table stored in memory 20 (S310).

1 The error table includes various error messages respectively corresponding to
2 the errors that may occur in the facsimile in look-up table style. The error table is
3 stored when the facsimile is manufactured. Controller 10 stores the telephone number
4 of the second facsimile input by the user at step S301 and the error message detected
5 at step S310 in error buffer 30 (S311). Step S311 is followed by step S308 of cutting
6 off the communication line with the transmitting facsimile machine. Now, the
process of transmitting the error information including the error message generated
in the receiving facsimile machine and the telephone number of the second facsimile
to the transmitting facsimile machine in the event that an error occurs in the receiving
facsimile machine while the fax data is transmitted will be described with reference
to Figure 4.

Figure 4 is a flowchart for transmitting the error information stored in error
buffer 30 according to the operation of Figure 3 to the transmitting facsimile machine.
In the event that the communication line with the transmitting facsimile machine is
cut off due to the error occurrence in the facsimile of the receiving facsimile machine
while the fax data is received, controller 10 converts the error information stored in
error buffer 30, *i.e.*, the telephone number of the second facsimile and the error
message into bit-map data (S401). When the telephone number of the second

1 facsimile and the error message is completely converted into bit-map data, TSI
2 information (telephone number of the transmitting facsimile machine) detected at step
3 S305 of Figure 3 and stored in memory 20 is detected (S402) and the detected
4 telephone number is dialed (S403).

5 When a communication line with the transmitting facsimile machine is formed,
6 controller 10 transmits the bit-map data converted and stored in error buffer 30 at step
S401 (S405). Therefore, even though the communication line is cut off due to the
error occurrence in the receiving facsimile machine while the fax data is transmitted,
the transmitting facsimile machine can continuously transmit the transmission-
interrupted fax data according to the error information including the contents of the
error and the telephone number of the second facsimile which is capable of receiving
the fax data instead. In other words, the transmitting facsimile machine can easily
checks the state of the receiving facsimile machine by outputting the error
information transmitted from the receiving facsimile machine as shown in Figure 5.
Therefore, the transmitting facsimile machine can transmit fax data that is not
completely transmitted to the second receiving facsimile machine.

17 The several embodiments of this invention has been described above with
18 reference to the aforementioned embodiments. It is evident, however, that may

1 alternatives, modifications and variations will be apparent to those having skill in the
2 art in light of the foregoing description. Accordingly, the present invention embraces
3 all such alternatives, modifications and variations as fall within the spirit and scope
4 of the appended claims and their equivalents.

5 The foregoing paragraphs describe a process and telecommunications circuit
6 able to compensate for the unexpected occurrence of a malfunction within the
7 receiving facsimile machine that prevents the prompt transmission of facsimile data
8 from the transmitting facsimile machine to the malfunctioning receiving machines,
9 by the expedient of storing the transmitting subscriber identification (TSI)
10 information, that is, the telephone number of the transmitting facsimile machine, and
11 having the receiving facsimile machine call that telephone number in the event that
12 a communication line is cut off due to error occurrence in receiving facsimile data,
13 and inform the transmitting facsimile machine of error information including the
14 contents of the error occurring in the receiving facsimile machine and the telephone
15 number of an alternate receiving facsimile machine that is capable of serving for the
16 first receiving facsimile machine. According to the principles of the present
17 invention, the receiving facsimile machine informs the transmitting facsimile machine
18 of error occurrence in the receiving facsimile machine of the facsimile, the

1 transmitting facsimile machine is informed of error information including the
2 contents of the error occurring in the receiving facsimile machine and the telephone
3 number of the second receiving facsimile machine in the event that an error occurs
4 while fax data is received and that it is impossible to receive further fax data.
5 Therefore, the transmitting facsimile machine can continuously transmit the fax data
6 to the second receiving facsimile machine according to the second receiving facsimile
7 machine and contents of error report transmitted from the error-occurred receiving
facsimile machine. As a result, the present invention provides advantages of easy
check of the contents of the error occurring in the receiving facsimile machine and
rapid transmission of the fax data.